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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,757	10/30/2003	Frank A. Baiocchi	2-8-2-3	8761

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Ryan, Mason & Lewis, LLP
90 Forest Avenue
Locust Valley, NY 11560

EXAMINER

NGUYEN, THINH T

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 04/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/697,757

Applicant(s)

BAIOCCHI ET AL.

Examiner

Thinh T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 18-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 10-17 is/are rejected.
- 7) ☐ Claim(s) 4-9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED OFFICE ACTION

Election/Restriction

1. Applicant's election **with traverse** of claims 1-17 in the communication with the office on 2/24/2005 is acknowledged.

Because Applicant did not distinctly and specifically point out the supposed error in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Applicants have the right to file a divisional, continuation or continuation-in-part application covering the subject matter of the non-elected claims.

The traversal is on the ground(s) that see the election paper. This is not found persuasive For the following reasons:

A/ Applicant has not proved that the alleged method proposed by the Examiner; a **method materially different from claim 1 to produce the device of claim 18 is not a feasible method.**

B/ **for semiconductor processing the order of execution of the process of manufacturing (that can comprises many sub-processes) are very important and they are materially different from each other.**

C/ Moreover, it must be reiterate to the applicant that Inventions of group II and I are related as process of making and product made. The inventions are distinct if either or both of following can be shown: (1) that the process as claimed can be use to make other and materially different product or by hand, or (2) that process as claimed can be made by another and materially different process. (MPEP § 806.05(f)). In the instance case unpatentabilities of the

group I invention would not necessarily imply unpatentability of the group II invention, since the device of the group I invention could be made by the processes materially different from those of the group II invention,

D/ Furthermore, because the fields of search for method and device claims are NOT coextensive and the determinations of patentability of method and device claims are different, that is process limitations and device limitations are given weight differently in determining the patentability of the claimed inventions. Also, the strategies for doing text searching of the device claims and method claims are different. Thus, separate searches are required.

The requirement is still deemed proper and is therefore made **FINAL** and non-elected claims 18-22 are not being considered in the present Office Action.

Drawings

3 The drawings are objected to under 37 CFR 1.83(a) for failing to show every feature of the invention specified in the claim: all the feature of a trench with V-grove as claimed in claim 4 must be shown or the claim be cancelled.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the

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drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant cooperation is requested in correcting any errors of which the applicant may become aware in the specification.

Claim Objection

5. Claim 4 is objected to as lacking antecedent basis and make it non-compliant with 35 U.S.C. 112 second paragraph.

There is no support of claim 4 which claimed a trench that comprises a V groove in the drawings or in the specification.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b/e) that form the basis for the rejections under this section made in this office action.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language

7. Claim 1,3,10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Woodberry (U.S. Patent 5,856,700)

REGARDING CLAIM 1

Woodberry (the abstract, fig 2B and 2D, column 3 lines 14-20,column 4 line 11) discloses a method of forming a semiconductor structure on a semiconductor wafer, the method comprising the steps of: forming an epitaxial layer on a least a portion of a semiconductor substrate of a first conductivity type; forming at least one trench through the epitaxial layer to at least partially expose the substrate, doping at least one or more sidewalls of the at least one trench with an impurity of a known concentration level so as to form a low-resistance electrical path between an upper surface of the epitaxial layer and the substrate, and substantially filling the at least one trench with a filler material.

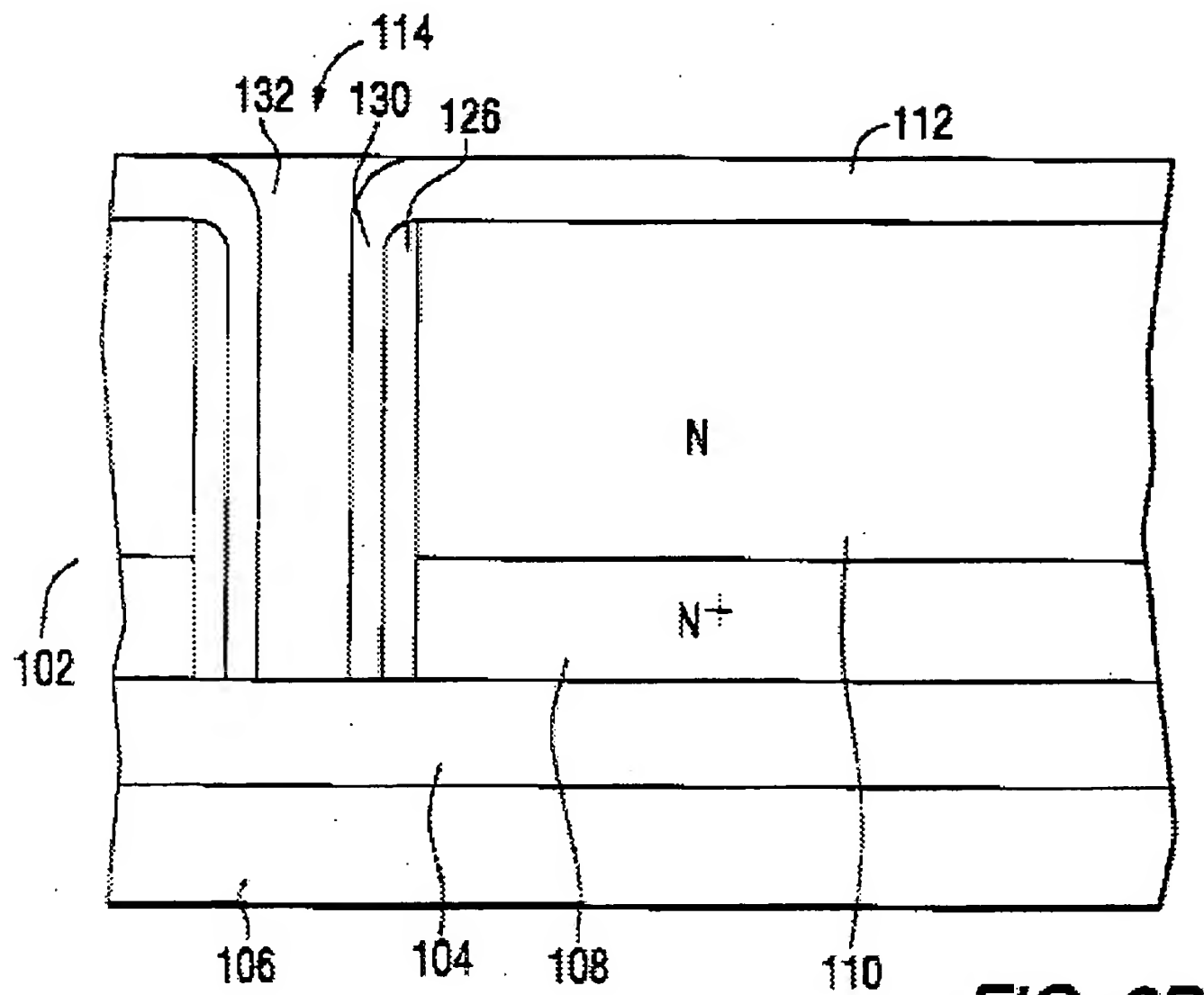
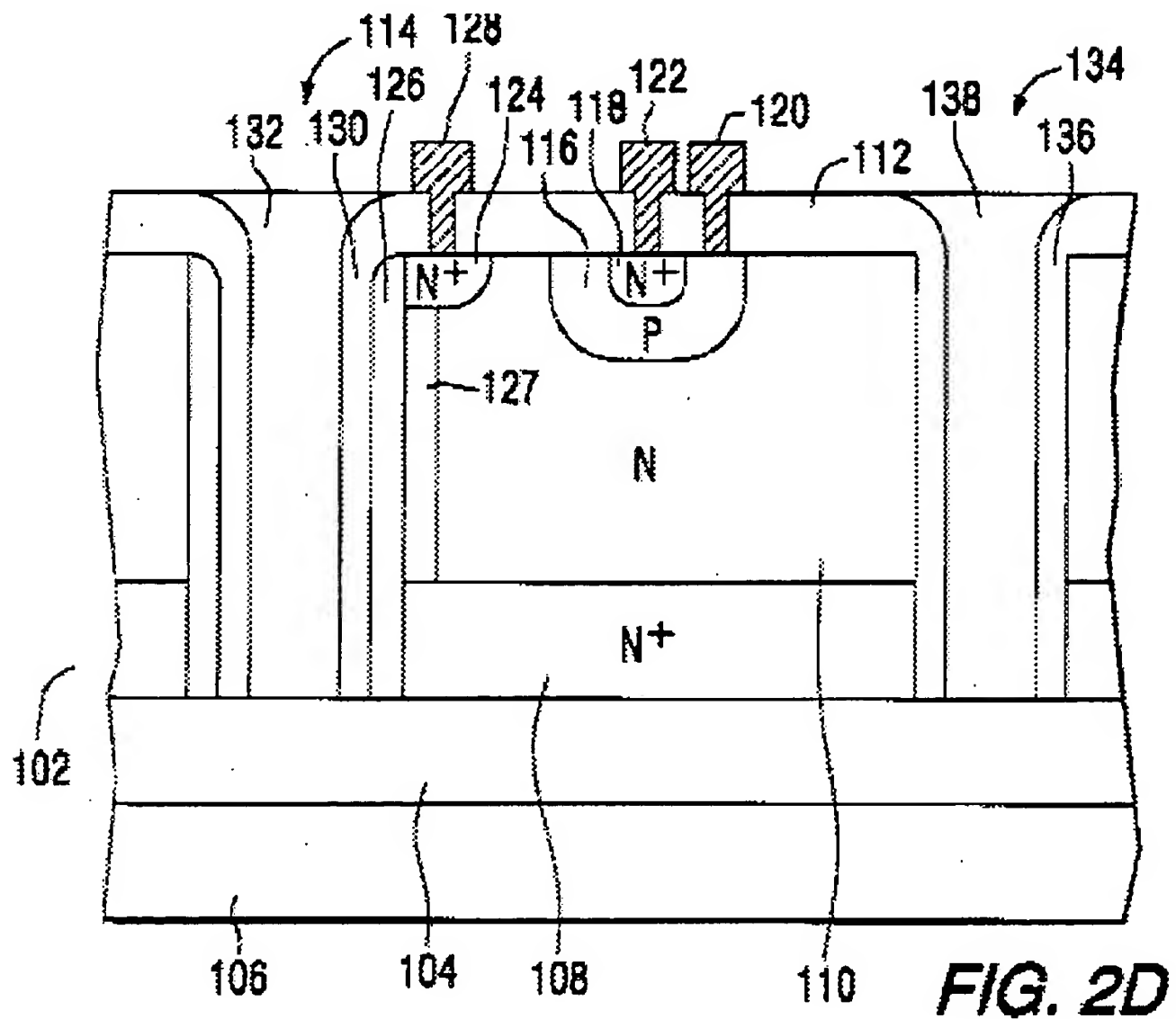


FIG. 2B



REGARDING CLAIM 3

Woodberry (the abstract, fig 2B and 2D, column 4 lines 1-3, trench 114) discloses a method of forming a semiconductor structure on a semiconductor wafer, wherein the step of forming the at least one trench comprises: forming an insulating layer on at least a portion of the epitaxial layer, forming at least one opening in the insulating layer corresponding to the at least trench, and etching through the epitaxial layer to at least partially expose the substrate.

REGARDING CLAIM 10

Woodberry (the abstract, fig 2B and 2D) discloses a method of forming a semiconductor structure wherein the step of substantially filling the at least one trench comprises depositing a semiconductor material in the at least one trench so as to substantially fill the trench.

REGARDING CLAIM 11

Woodberry (the abstract, fig 2B and 2D, column 4 lines 25-26) discloses a method of forming a semiconductor structure wherein the filler comprises polysilicon material.

REGARDING CLAIM 12

Woodberry (the abstract, fig 2B and 2D, column 4 lines 1-2) discloses a method of forming a semiconductor structure comprising the step of forming at least one insulating Layer (fig 2B, layer 112) on at least a portion of the epitaxial layer.

REGARDING CLAIM 13

Woodberry (the abstract, fig 2B and 2D,) discloses a method of forming a semiconductor structure comprising the step of: forming an active device in the epitaxial layer proximate the upper surface of the epitaxial layer, the active device being in electrical connection with a first end of the at least one trench, a second end of the at least trench being electrically connected to the substrate.

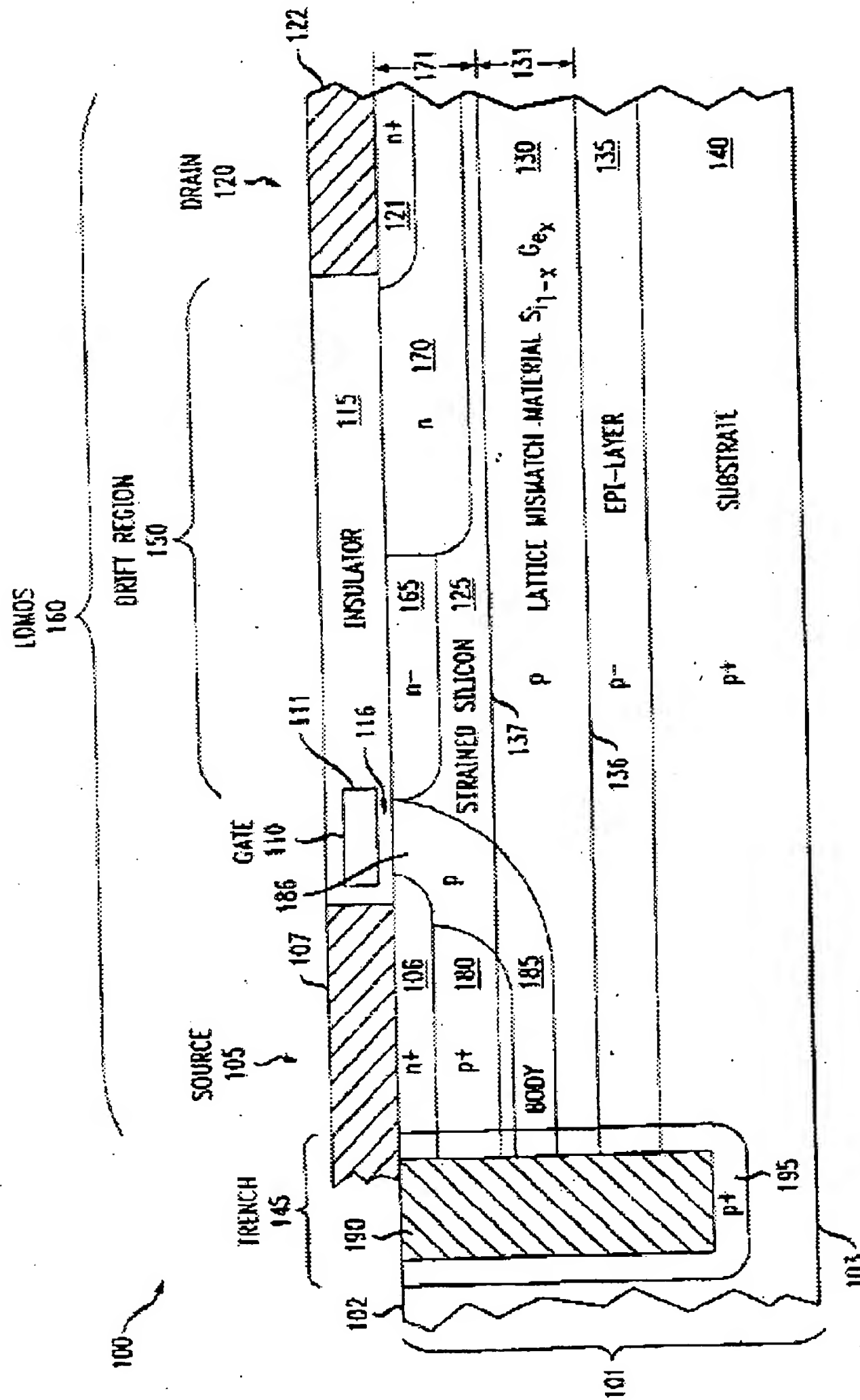
8. Claim 14-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Hergenrother et al. (US patent 6,828,628)

REGARDING CLAIM 14,15

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Hergenrother discloses (in the abstract, in fig 1) a method of making a semiconductor that has a doped connecting trench sidewalls and the active device is a MOS device that has the gate in the insulated layer with first and second source / drain region and with first source/ drain Region connected to a substrate with a trench.

FIG. 1



Claim Rejections - 35 USC § 103

9. The following is a quotation of U.S.C. 103(a) which form the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2,4,16,17 rejected under 35 U.S.C. 103(a) as being unpatentable over Woodberry (U.S. patent 5,856,700) in view of further remark.

REGARDING CLAIM 2

Woodberry discloses all the invention except for the use of polishing the upper surface of the semiconductor. This feature such as Chemical Mechanical Polishing in trench manufacturing, however, has become old and well known in the art.

A person skilled in the art at the time the invention was made would have been capable of implement this step without any special teachings for a purpose of completing or improving the process for making the semiconductor device.

REGARDING CLAIM 4

Woodberry discloses all the invention except for the fabricating of trench with V-groove. This feature, however, has become old and well known in the art.

A person skilled in the art at the time the invention was made would have been capable of implement this step without any special teachings for a purpose of improving the process for making the semiconductor device.

REGARDING CLAIM 16,17

Woodberry discloses all the invention except for the relative spacing dimension or the width of the trenches. However, it would have been obvious for one skilled in the art at the time the invention was made using the teachings of Woodberry and his ordinary skill to come up with the invention of claim 16,17 since it has been held that where the general condition was disclosed in the prior art discovering the optimum or workable range involves only routine skill in the art.

ALLOWABLE SUBJECT MATTER

11. Claims 5-9 are objected as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claim.

Claim 5-9 are considered allowable since the prior fails to a method of making semiconductor that has all the steps as recited in claim 5.

12. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

13. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period

for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

CONCLUSION

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose telephone number is 571-272-1790.

The examiner can normally be reached on Monday-Friday 9:00am-6:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached at 571-272-1787.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Thinh T. Nguyen 

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David Nelms
Supervisory Patent Examiner
Technology Center 2800